

FIG. 1 RELATED ART

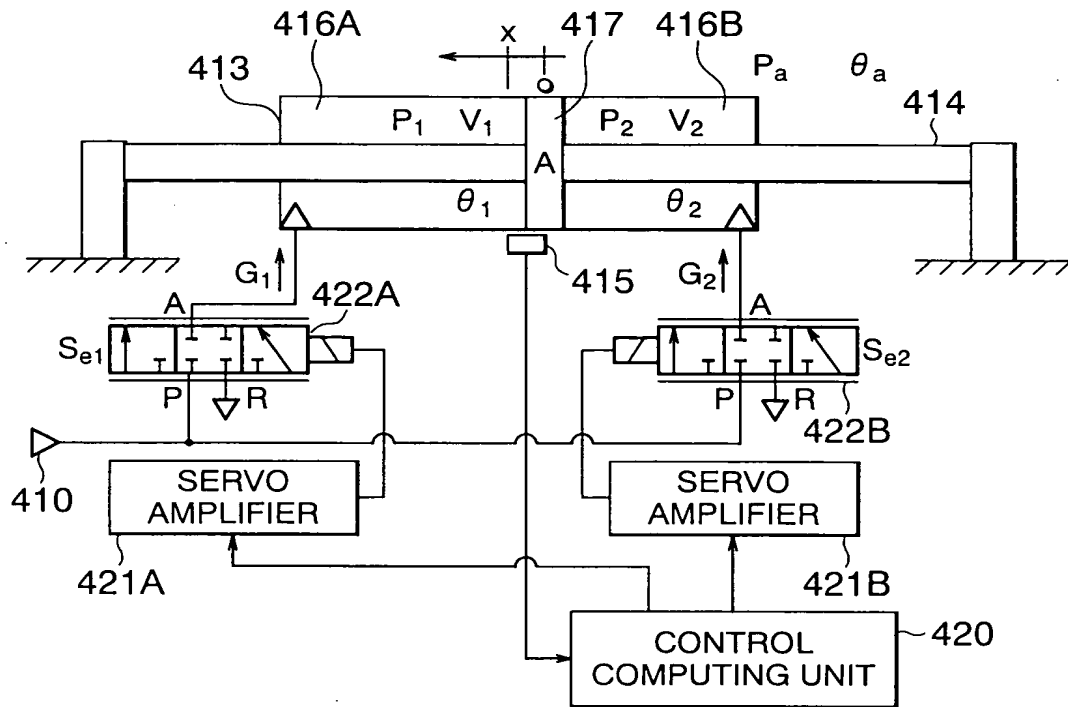


FIG. 2 RELATED ART

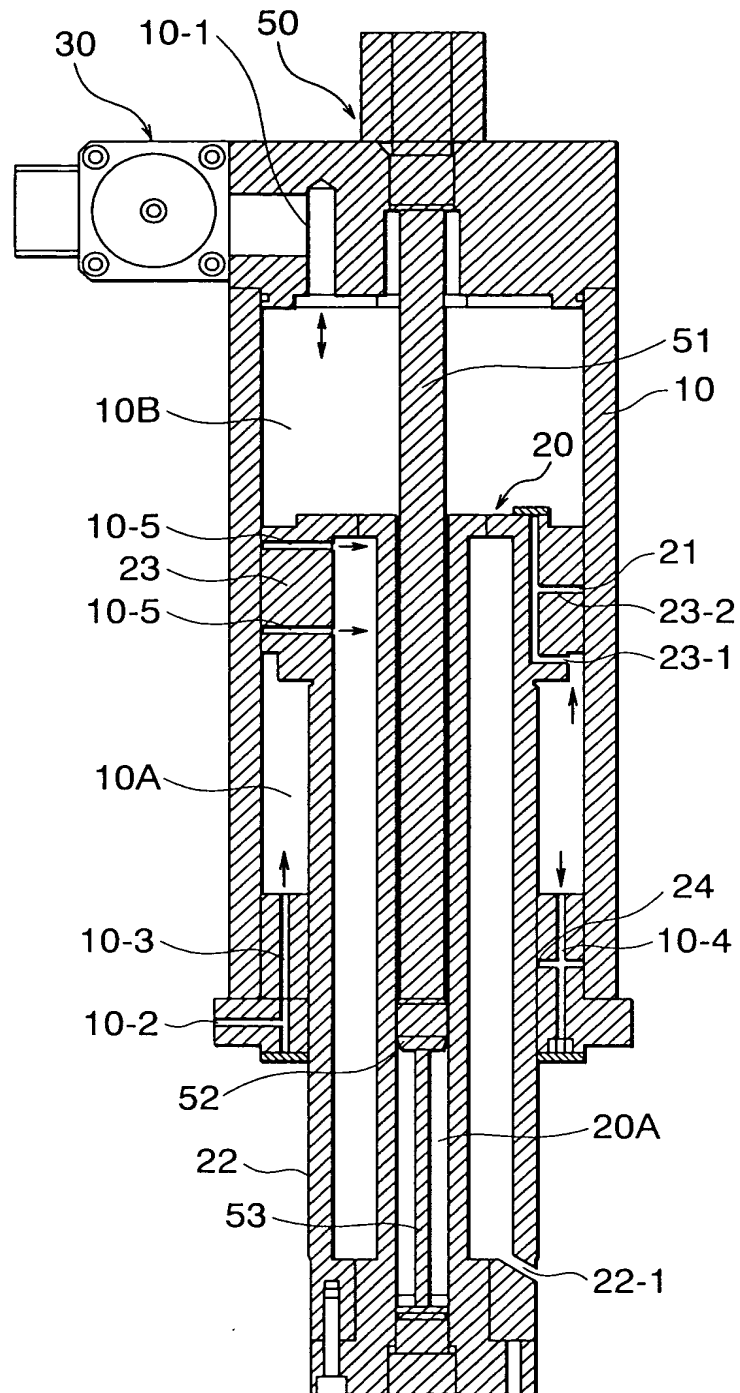


FIG. 3

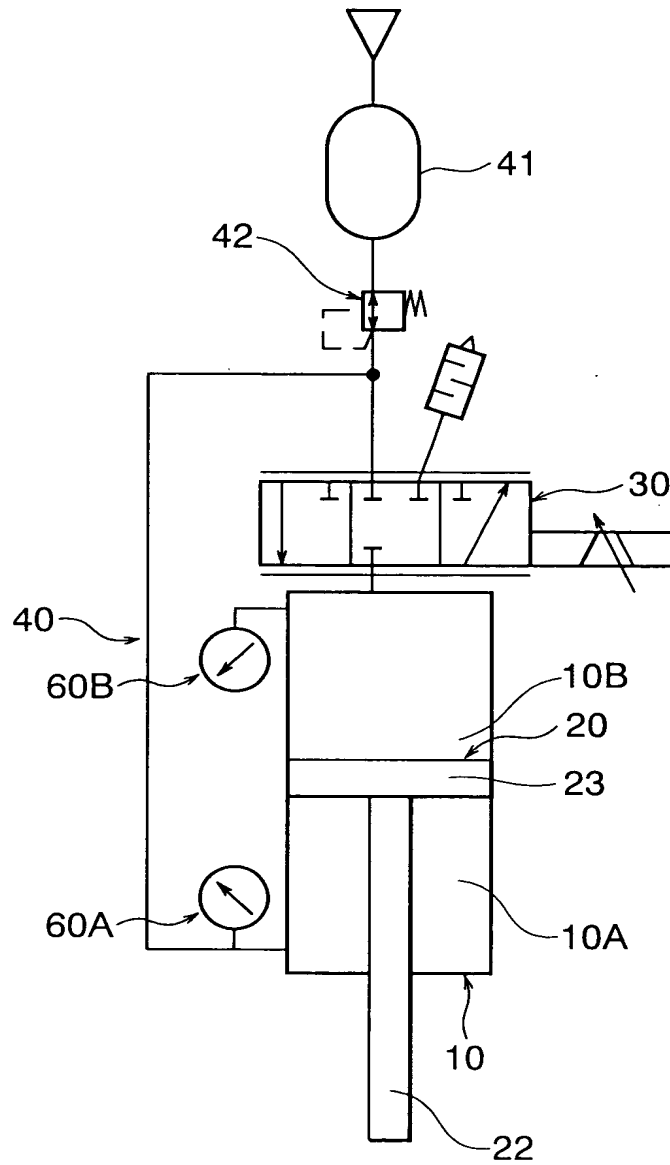


FIG. 4

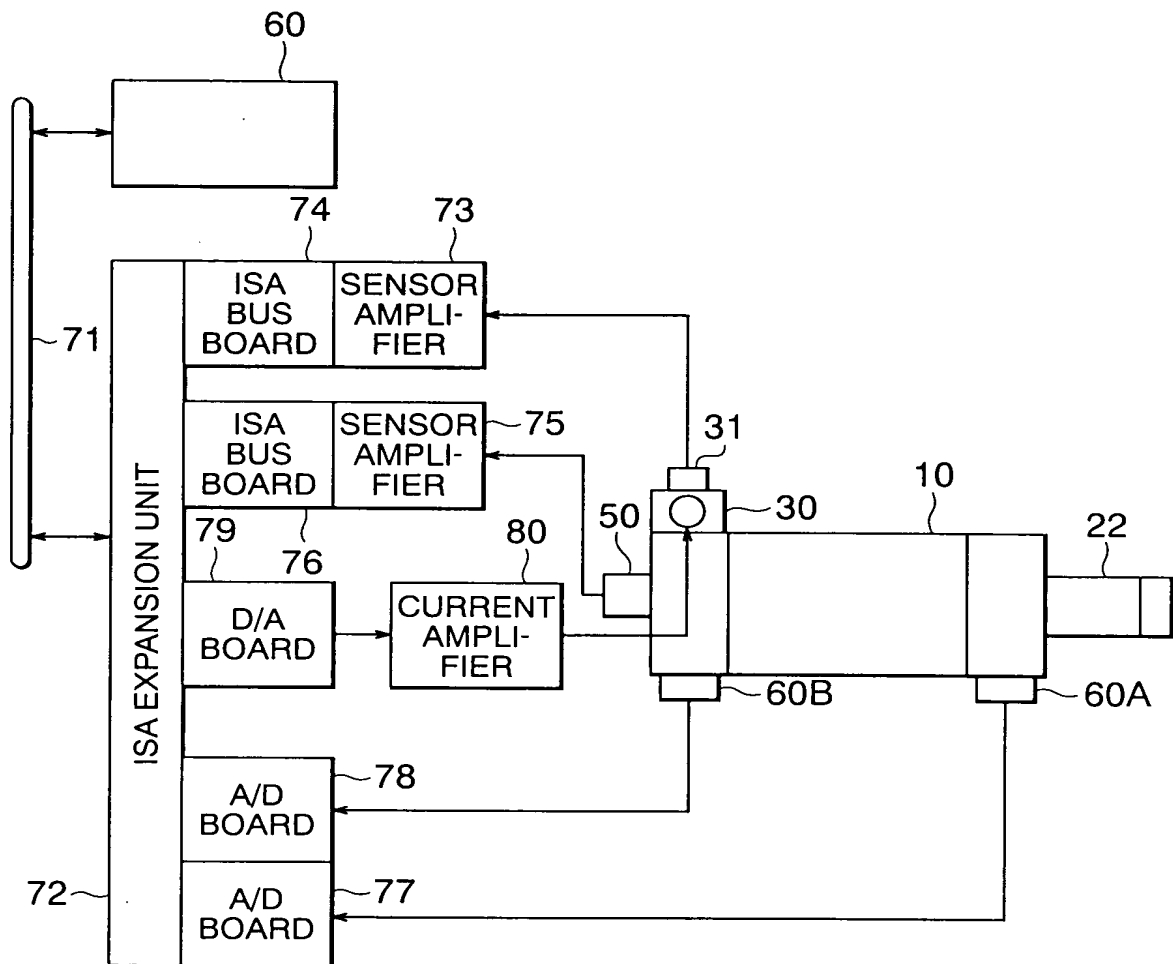


FIG. 5

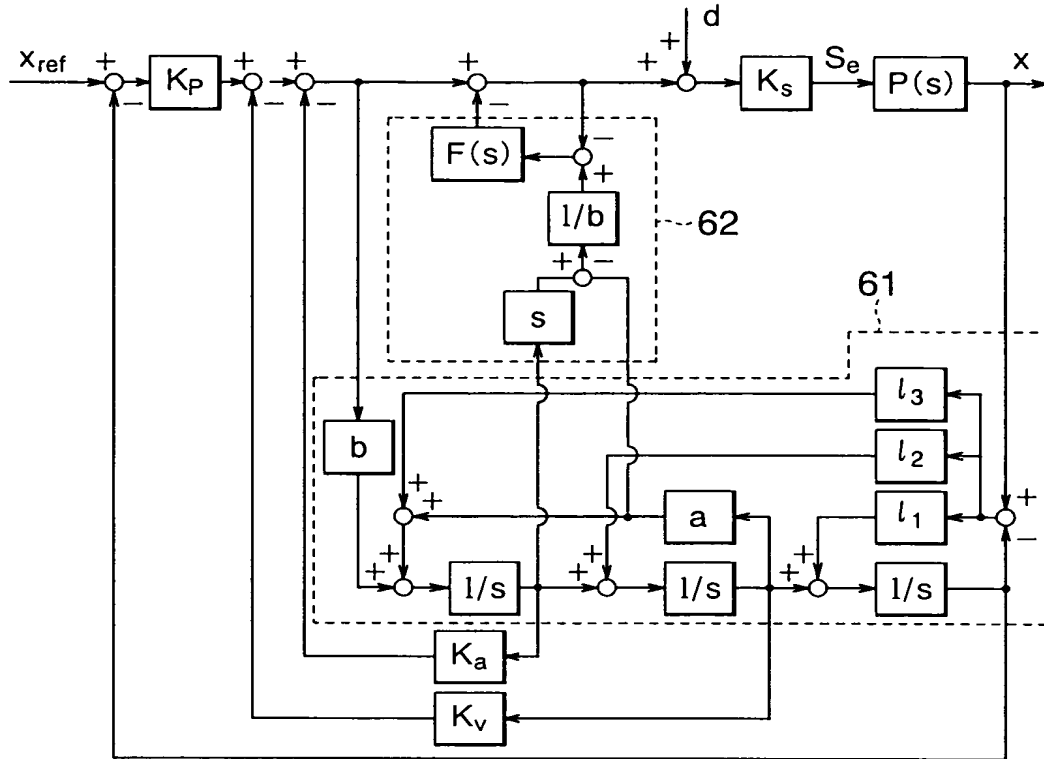


FIG. 6

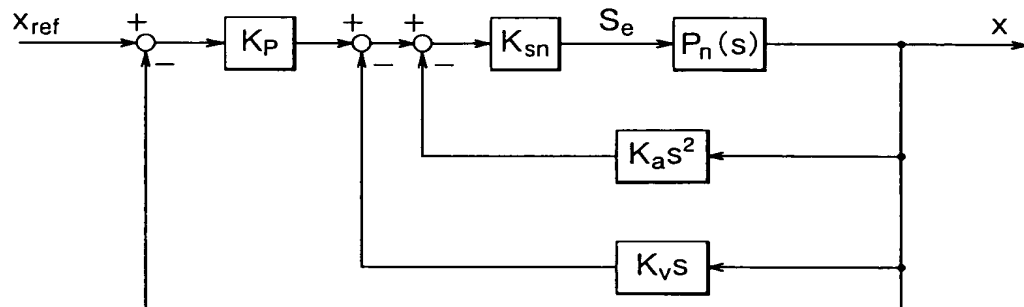


FIG. 7

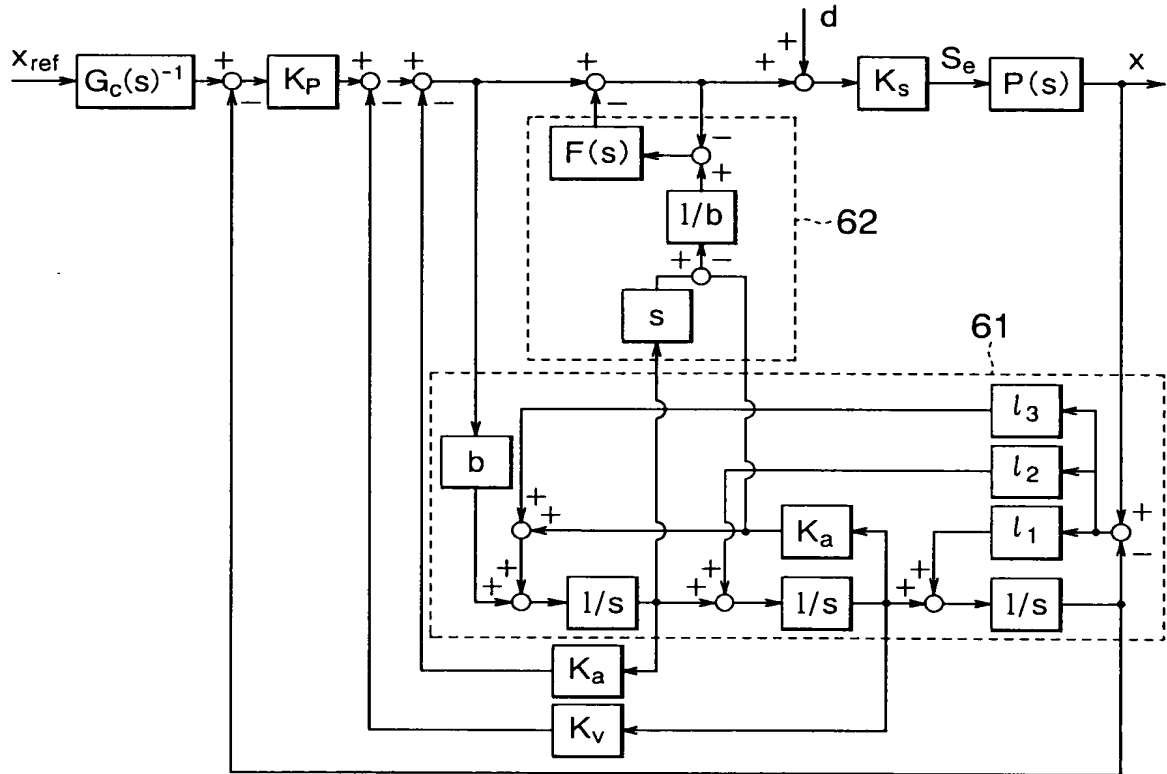


FIG. 8

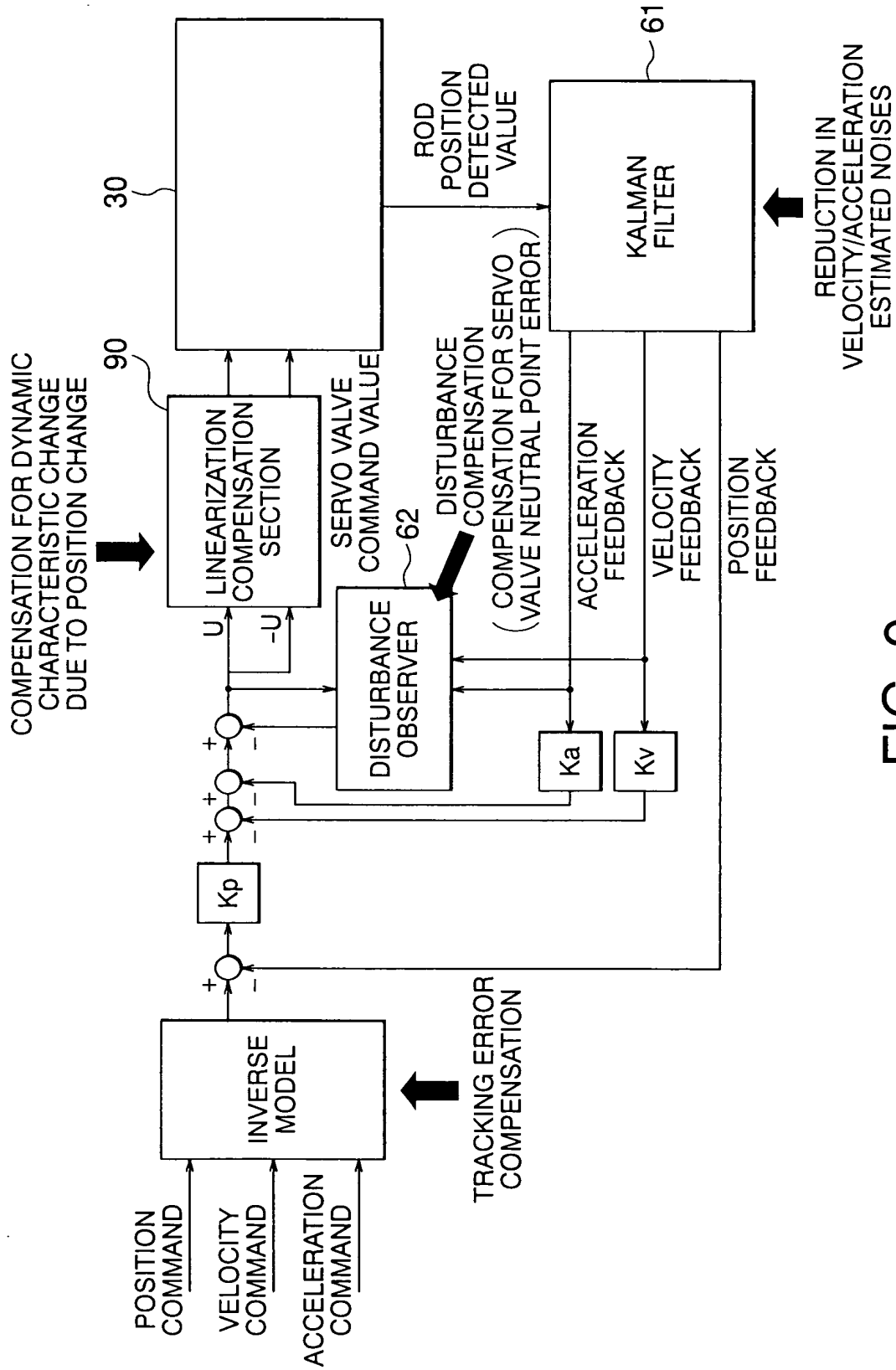
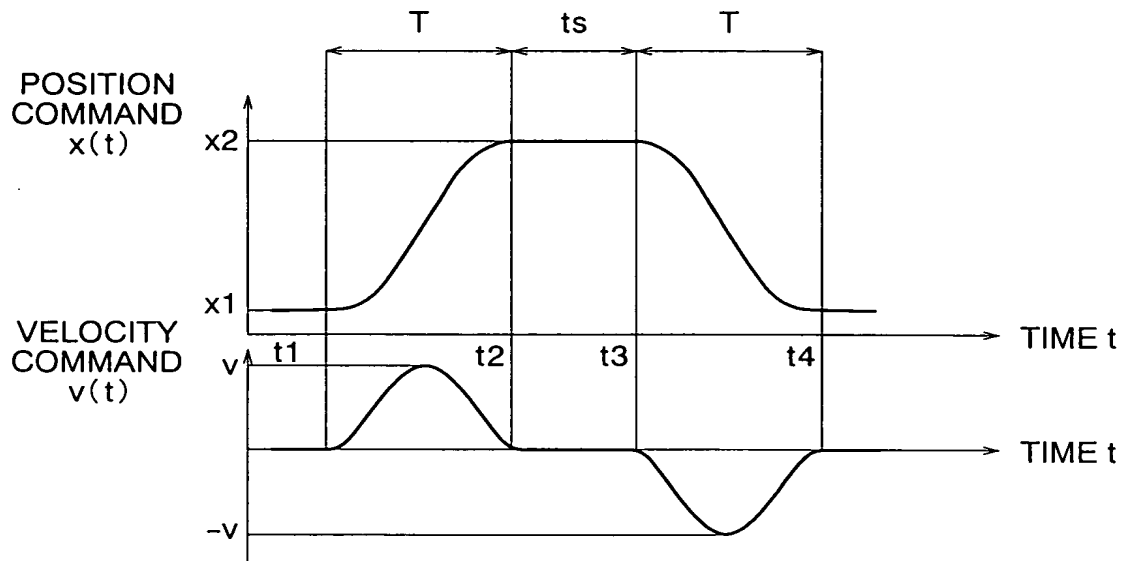


FIG. 9





POSITION AND VELOCITY PROFILES DURING  
S-SHAPED WAVEFORM POSITION CONTROL

FIG. 10

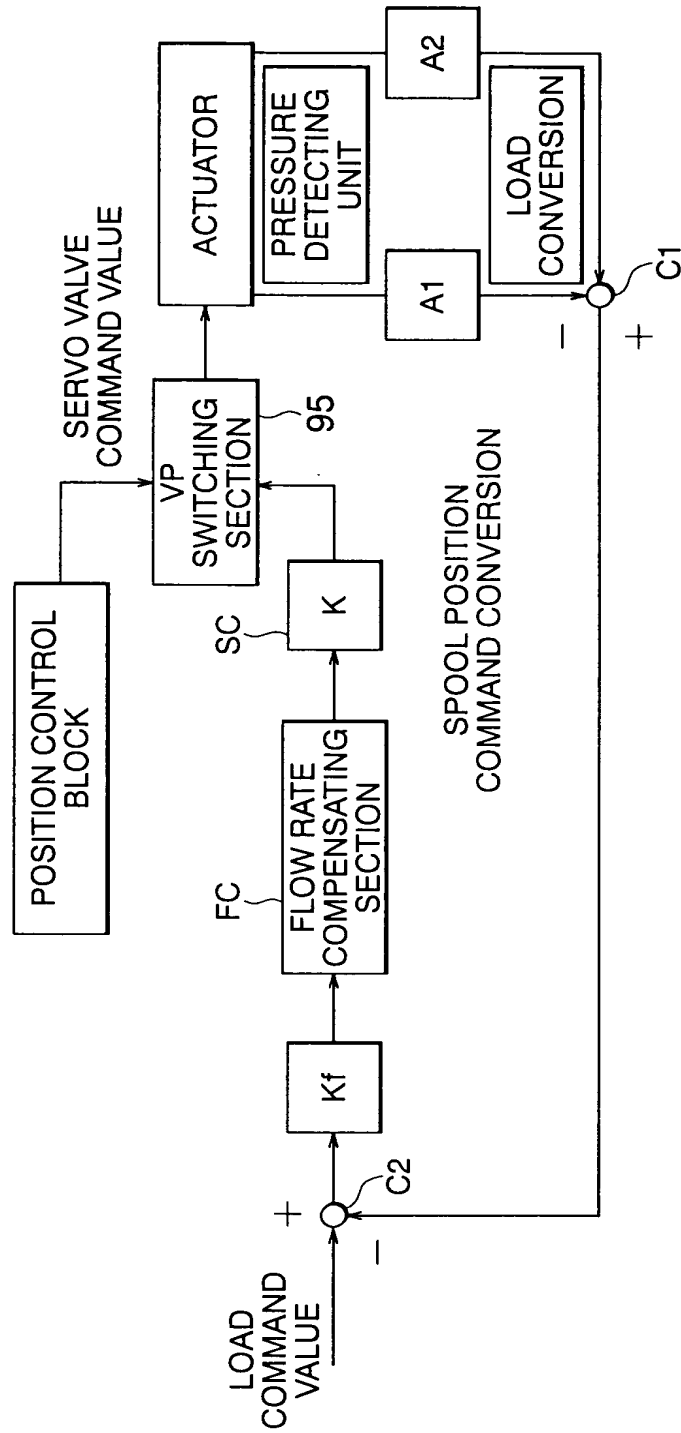


FIG. 11

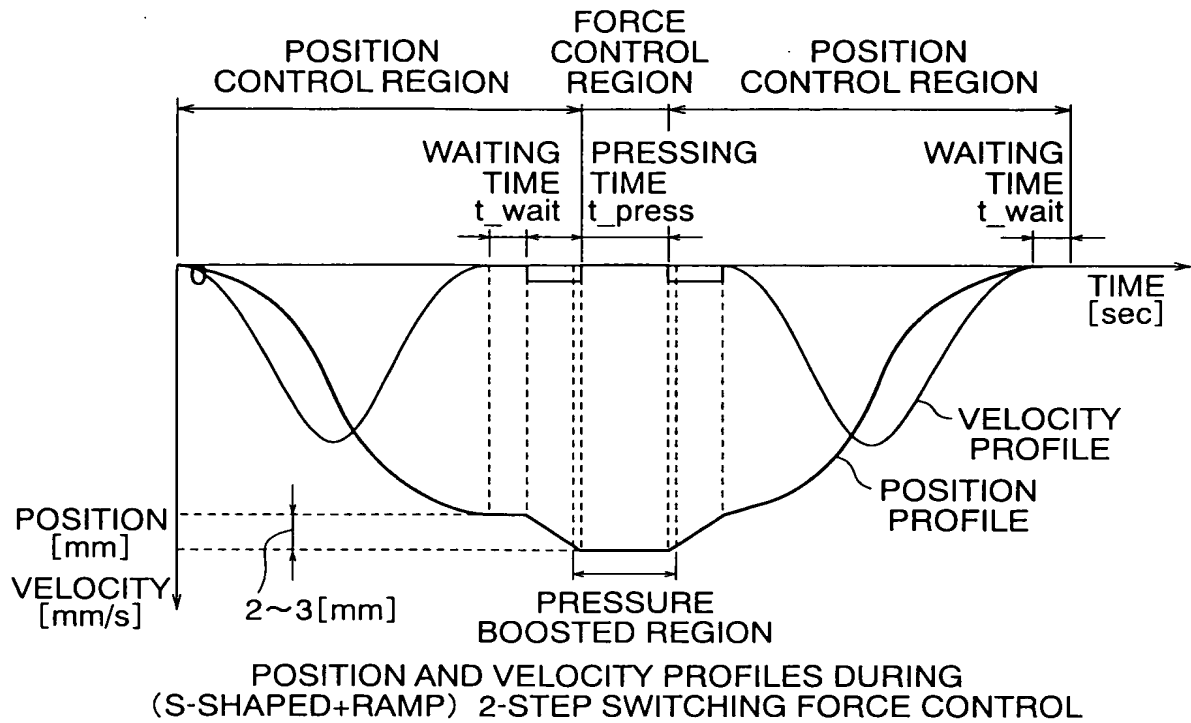


FIG. 12A

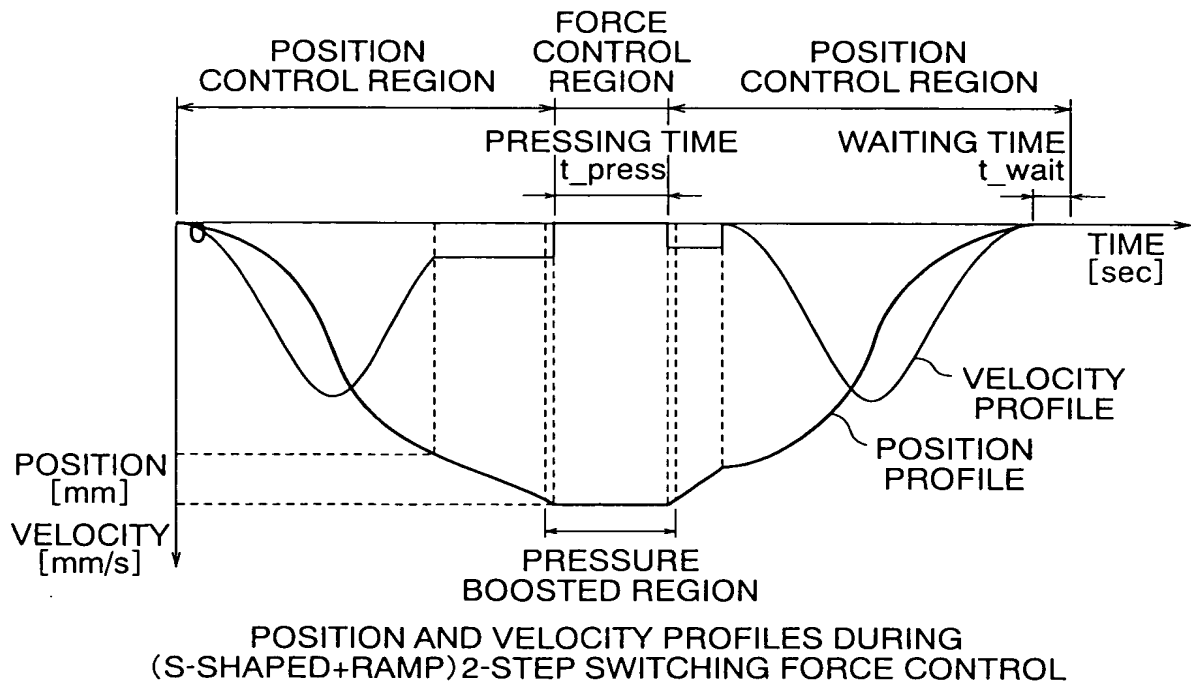
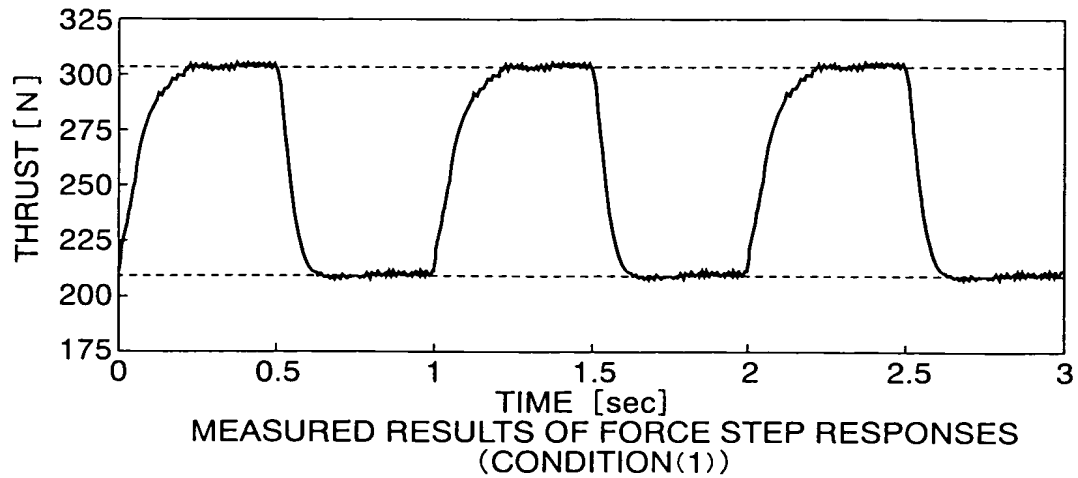
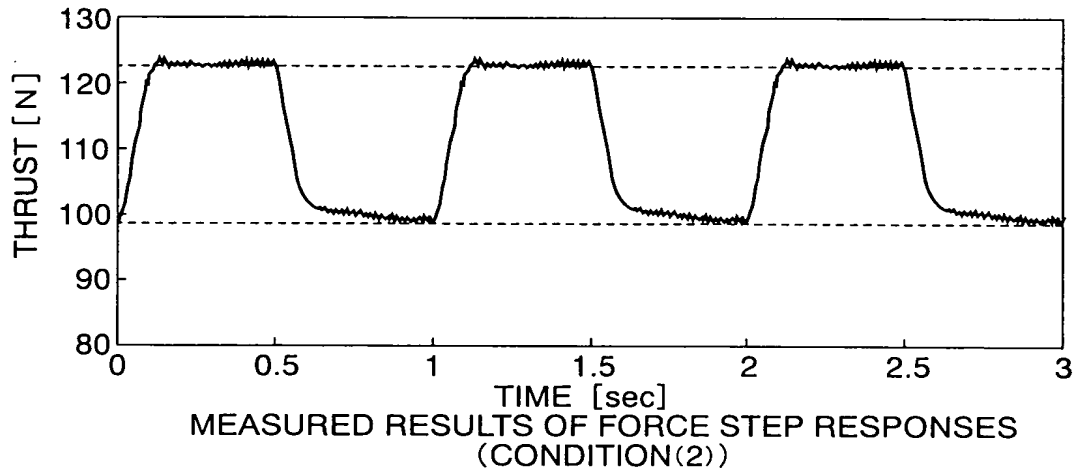


FIG. 12B



**FIG. 13A**



**FIG. 13B**

THRUST MEAN VALUES AND ERROR WIDTHS IN  
FORCE STEP RESPONSE (CONDITION(1))

THRUST COMMAND VALUE [N]	300.00	200.00
THRUST MEAN VALUE [N]	303.52	210.11
ERROR WIDTH [N]*	0.39	0.64

\*ERROR WIDTH = (MAXIMUM MEASURED VALUE)  
-(MINIMUM MEASURED VALUE)

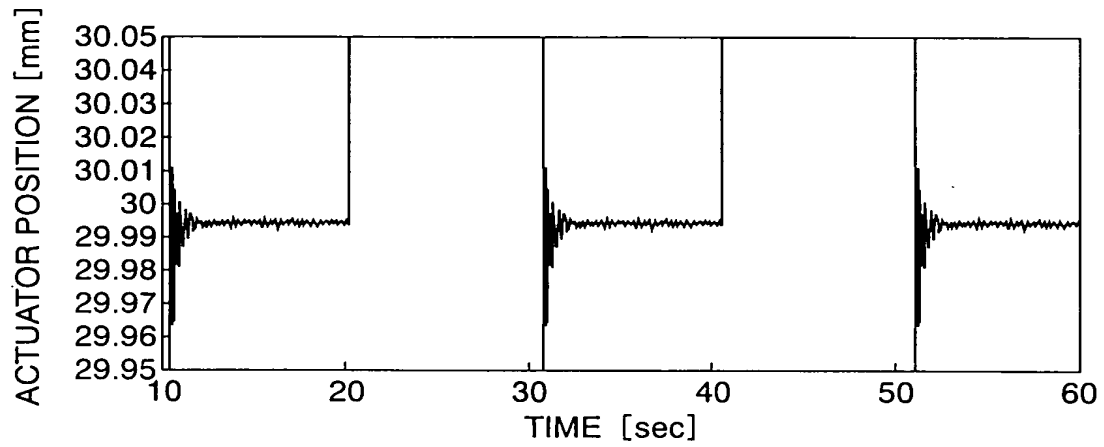
**FIG. 13C**

THRUST MEAN VALUES AND ERROR WIDTHS IN  
FORCE STEP RESPONSE (CONDITION(2))

THRUST COMMAND VALUE [N]	90.00	110.00
THRUST MEAN VALUE [N]	99.42	122.82
ERROR WIDTH [N]*	0.06	0.27

\*ERROR WIDTH = (MAXIMUM MEASURED VALUE)  
-(MINIMUM MEASURED VALUE)

**FIG. 13D**



MEASURED DATA OF REPEATED  
POSITIONING ACCURACY (x=30[mm])

FIG. 14A

REPEATED POSITIONING ACCURACY

PLACE	POSITION MEAN VALUE	$3\sigma$
x1	29.994 [mm]	0.36 [ $\mu\text{m}$ ]
x2	109.975 [mm]	0.34 [ $\mu\text{m}$ ]

FIG. 14B

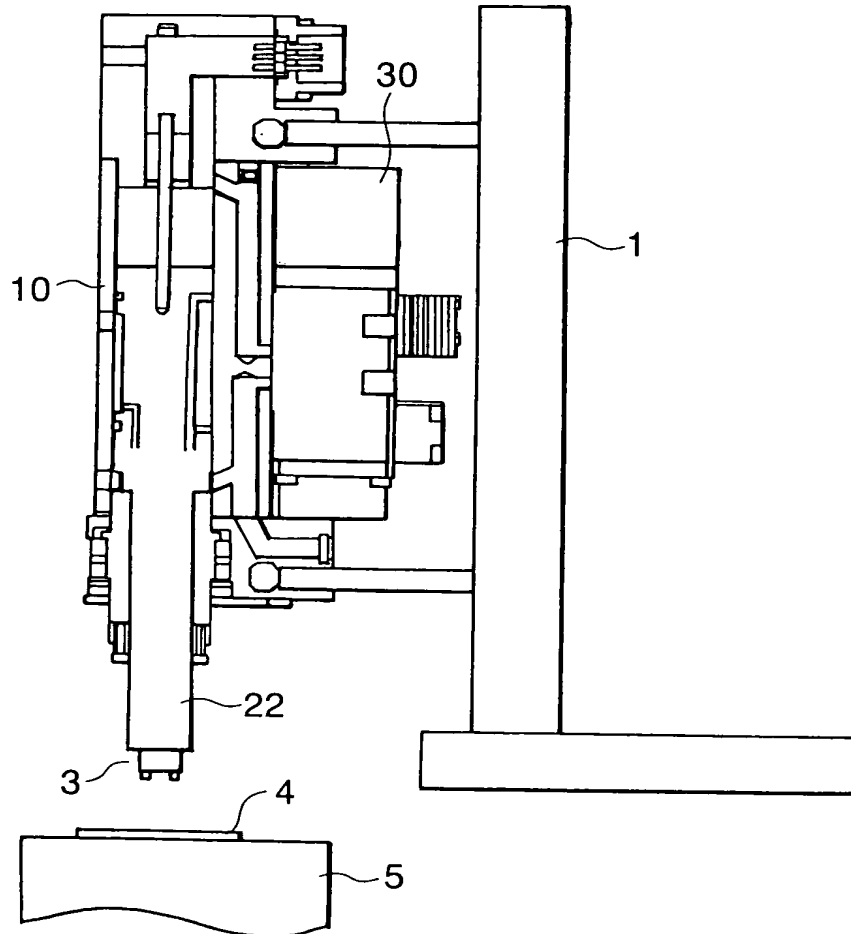


FIG. 15